

# PHYSICS 563. Introduction to Solid State Physics I

## Fall 2020

**Instructor:** Dr Andriy Nevidomskyy, Dept. of Physics and Astronomy, Rice University.

**Course Credit:** 3 semester hours.

**Lectures:** Tue/Thu, 11:20am-12:40pm.

**Format:** Because of the covid-19 pandemic and restrictions imposed by the University, the instruction will be fully remote (conducted online via Zoom) this Fall semester 2020.

Zoom link: <https://riceuniversity.zoom.us/my/topoquant>

## Course Description

The subject of solid state physics has a venerable history dating back to the 19th century. With the discovery of the laws of quantum mechanics in the 1920s, the classical description of the motion of electrons had to be revisited and put on a completely new basis, forming the basis of the quantum theory of solids as we know it now. This course will cover a set of topics describing the key properties of solids. This is a vast subject, and some subjects will be left out intentionally or relegated for self-study given the time constraints inherent to the one semester nature of the course.

**Objectives:** This course is geared towards anyone intending to do research in the field of condensed matter physics, as well as anyone interested in the behavior of electrons in crystalline lattices. The objective is for the students to become closely familiar with the various aspects and terminology of solid state physics, as well as being able to explain and derive various electronic properties of solids.

**Prerequisites:** Acquaintance with quantum mechanics and thermodynamics at an undergraduate level is a prerequisite, as are basic calculus and geometry.

**Learning outcomes:** To gain thorough knowledge of the key aspects of solid state physics. To get equipped to understand the basic terminology so as to be able to read original research literature and prepare one to conduct independent research in this field.

**Rice Honor Code:** In this course, all students will be held to the standards of the Rice Honor Code, a code that you pledged to honor when you matriculated at this institution. If you are unfamiliar with the details of this code and how it is administered, you should consult the Honor System Handbook at <http://honor.rice.edu/honor-systemhandbook>. This handbook outlines the University's expectations for the integrity of your academic work, the procedures for resolving alleged violations of those expectations, and the rights and responsibilities of students and faculty members throughout the process.

### Assignments and Grading:

Class attendance is expected. You are responsible for the material that will be covered in class and for all the homework problems assigned each week. The assigned homework will be graded each week. The home work needs to be done independently, and all home works have assigned deadlines.

You will have at least one week of time to do the homework. Study by consulting first your class notes and then finding the appropriate material in your textbook. Study carefully the problems that are worked out in the textbook.

The course will include at least one mid-term and a final exam, all to be taken remotely because of the covid-19 restrictions. The details of the exams and their dates will be announced with due notice by email and on the Canvas page for the course.

The grading will be based on the weekly homework assignments and the aforementioned exams. The grading percentages for each component will be announced separately on the Canvas page for the course.

**Syllabus Change Policy:** This syllabus is only a guide for the course and is subject to change with advanced notice.

**Required Text:**

C. Kittel, *Introduction to Solid State Physics* (Wiley, 8th Edition).

**Other Texts (optional, for self-study):**

N. W. Ashcroft and N. D. Mermin, *Solid State Physics*.